

Claims

1. A liquid crystal information display comprising a layer of liquid crystal material between panels of functional layers in which the layer of liquid crystal material has parameters providing at least one interference maximum or minimum of transmission or reflection for at least one linearly polarized component of light at at least one wavelength reflected or transmitted at the exit of the display and/or at the boundary between at least two functional layers and/or the layer of liquid crystal material and a functional layer.

2. A liquid crystal information display according to claim 1, wherein in the capacity of functional layers the display contains at least one layer of polarizer and/or at least one electrode layer and/or at least one alignment layer and/or at least one planarization layer and/or at least one retarder layer and/or at least one anti-reflective layer and/or at least one light-reflecting layer and/or at least one color filter layer and/or at least one protective layer and/or at least one layer simultaneously functioning as at least two of the above listed layers.

3. A liquid crystal information display according to any of claims 1 to 2, wherein at least one electrode layer and/or at least one alignment layer and/or at least one planarization layer and/or at least one anti-reflective layer and/or at least one light-reflecting layer and/or at least one color filter layer and/or at least one layer simultaneously functions as at least two of the above listed layers is anisotropic.

4. A liquid crystal information display according to claim 1 or 2, wherein the interference maximum or minimum of transmission for the reflected or transmitted light at the exit of the display and/or at the boundary between at least two functional layers is provided with and/or without voltage bias on the electrode layer.

5. A liquid crystal information display according to claim 3, wherein the interference maximum or minimum of transmission for the reflected or transmitted light at the exit of the display and/or at the boundary between at least two functional layers is provided with and/or without voltage bias on the electrode layer.

6. A liquid crystal information display according to claim 1 or 2, wherein the optical thickness of at least one functional layer provides the interference maximum or minimum of transmission at the exit of the display and/or at the boundary of at least two functional layers.

5 7. A liquid crystal information display according to claim 3, wherein the optical thickness of at least one functional layer provides the interference maximum or minimum of transmission at the exit of the display and/or at the boundary of at least two functional layers.

8. A liquid crystal information display according to claim 4, wherein the optical
10 thickness of at least one functional layer provides the interference maximum or minimum of transmission at the exit of the display and/or at the boundary of at least two functional layers.

9. A liquid crystal information display according to claim 5, wherein the optical
15 thickness of at least one functional layer provides the interference maximum or minimum of transmission at the exit of the display and/or at the boundary of at least two functional layers.

10. A liquid crystal information display according to claim 1 or 2, wherein the
20 number and parameters of all layers in the display are coordinated so as to provide the interference maximum or minimum of transmission at the exit of the display.

11. A liquid crystal information display according to claim 3, wherein the number and
parameters of all layers in the display are coordinated so as to provide the interference maximum
or minimum of transmission at the exit of the display.

12. A liquid crystal information display according to claim 4, wherein the number and
25 parameters of all layers in the display are coordinated so as to provide the interference maximum
or minimum of transmission at the exit of the display.

13. A liquid crystal information display according to claim 5, wherein the number and
30 parameters of all layers in the display are coordinated so as to provide the interference maximum
or minimum of transmission at the exit of the display.

14. A liquid crystal information display according to claim 6, wherein the number and parameters of all layers in the display are coordinated so as to provide the interference maximum or minimum of transmission at the exit of the display.

5 15. A liquid crystal information display according to claim 7, wherein the number and parameters of all layers in the display are coordinated so as to provide the interference maximum or minimum of transmission at the exit of the display.

10 16. A liquid crystal information display according to claim 8, wherein the number and parameters of all layers in the display are coordinated so as to provide the interference maximum or minimum of transmission at the exit of the display.

15 17. A liquid crystal information display according to claim 9, wherein the number and parameters of all layers in the display are coordinated so as to provide the interference maximum or minimum of transmission at the exit of the display.

18. A liquid crystal information display according to claim 1 or 2, wherein at least one polarizer is an internal one.

20 19. A liquid crystal information display according to claim 3, wherein at least one polarizer is an internal one.

25 20. A liquid crystal information display according to claim 4, wherein at least one polarizer is an internal one.

21. A liquid crystal information display according to claim 5, wherein at least one polarizer is an internal one.

30 22. A liquid crystal information display according to claim 6, wherein at least one polarizer is an internal one.

23. A liquid crystal information display according to claim 7, wherein at least one polarizer is an internal one.

24. A liquid crystal information display according to claim 8, wherein at least one polarizer is an internal one.

25. A liquid crystal information display according to claim 9, wherein at least one polarizer is an internal one.

26. A liquid crystal information display according to claim 10, wherein at least one polarizer is an internal one.

27. A liquid crystal information display according to claim 11, wherein at least one polarizer is an internal one.

28. A liquid crystal information display according to claim 12, wherein at least one polarizer is an internal one.

29. A liquid crystal information display according to claim 13, wherein at least one polarizer is an internal one.

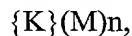
30. A liquid crystal information display according to claim 14, wherein at least one polarizer is an internal one.

31. A liquid crystal information display according to claim 15, wherein at least one polarizer is an internal one.

32. A liquid crystal information display according to claim 16, wherein at least one polarizer is an internal one.

33. A liquid crystal information display according to claim 17, wherein at least one polarizer is an internal one.

34. A liquid crystal information display according to claim 3, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:

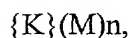


where K – the dye, chemical formula of which contains ionogenic group or groups, same or

different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n - the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

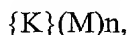
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35. A liquid crystal information display according to claim 4, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



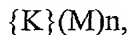
10 where K - the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n - the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

36. A liquid crystal information display according to claim 5, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



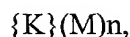
20 where K - the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n - the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

25 37. A liquid crystal information display according to claim 6, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



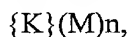
30 where K - the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n - the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

38. A liquid crystal information display according to claim 7, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



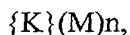
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

39. A liquid crystal information display according to claim 8, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



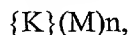
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

40. A liquid crystal information display according to claim 9, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



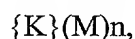
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

41. A liquid crystal information display according to claim 10, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



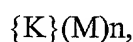
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

42. A liquid crystal information display according to claim 11, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



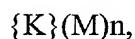
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n>1$ the anti-ions may be different.

43. A liquid crystal information display according to claim 12, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



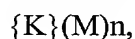
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n>1$ the anti-ions may be different.

44. A liquid crystal information display according to claim 13, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n>1$ the anti-ions may be different.

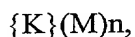
45. A liquid crystal information display according to claim 14, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n>1$ the anti-ions

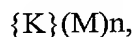
may be different.

46. A liquid crystal information display according to claim 15, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



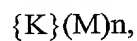
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M – the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

47. A liquid crystal information display according to claim 16, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



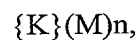
where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M – the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

48. A liquid crystal information display according to claim 17, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal phase, M – the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when $n > 1$ the anti-ions may be different.

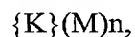
49. A liquid crystal information display according to claim 18, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal

phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when n>1 the anti-ions may be different.

5 50. A liquid crystal information display according to claim 19, wherein at least one optically anisotropic layer is an oriented film of organic dye of the formula:



where K – the dye, chemical formula of which contains ionogenic group or groups, same or different, which provide its solubility in polar solvents in order to form lyotropic liquid-crystal

10 phase, M - the anti-ion, n – the number of anti-ions in the dye molecule, which may be a fraction when one anti-ion belongs to several molecules, and in the case when n>1 the anti-ions may be different.

15 51. A liquid crystal information display according to claim 3 wherein at least one optically anisotropic layer is a crystalline film.